

**SYSTEMS AND METHODS FOR CHARACTERIZING LASER BEAM QUALITY**

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5 ABSTRACT OF THE DISCLOSURE

A measure of the quality of a laser beam is obtained by comparing the power of a theoretical Gaussian beam through a (certain sized area) pinhole to the power of a test beam through a same sized (area) pinhole. The theoretical surrogate Gaussian beam with the same second moment of intensity as the test beam is used to determine the "bucket size" used in "power-in-the-bucket" techniques. The bucket size is an interaction area determined by the wavelength of the laser light, the focusing distance, and the  $1/e^2$  radius of the near field intensity. The beam quality is determined by taking the square root of the ratio of the theoretical power through a bucket and the actual power through a pinhole with the same size as the bucket. The beam quality of different types of beam profiles can be obtained with a single method or measure.